Module 1: Introduction to Intelligent Transportation Systems (ITS) and Advanced Public Transportation Systems (APTS)

W elcome to

Transit Management
Training Course

Transit Management 1-1

TRANSIT MANAGEMENT TRAINING ROADMAP
Module 1: Introduction to ITS and APTS
Module 2: Automatic Vehicle Location Systems
Module 3: Automated Transit Information
Module 4: Transit Telecommunications
Module 5: Transit Operations Software
Module 6: Paratransit Computer-Aided Dispatch
Module 7: Electronic Fare Payment
Module 8: Technologies for Small Urban & Rural Transit Systems
Module 9: Stages of ITS Project Deployment
Module 10: What Can ITS Do for Me?

- Intelligent Transportation Systems

- Advanced Public Transportation Systems

Module 1: Introduction to ITS and APTS
1 Hour

Introduction

Schedule   The following table shows the times and activities for this module.

Time	Topic
10 min.	*Lecture/Discussion:* Agenda/Introductions/Goals
20 min.	*Lecture/Discussion:* ITS Concepts
25 min.	*Lecture/Discussion:* APTS Technologies
5 min.	*Exercise 1-1:* APTS Quick Reference Card
60 min.	Total Time

Before you begin   Have the following reference sources available for use during this course:

- ITS PCB registration form
- End of course evaluation form
- NTI Course Listings
- APTS Benefits document
- APTS Update 96
- APTS Update 98

Instructors   Write names of instructors on the board. Each instructor will briefly introduce him/herself to the class.

Introduction, Continued

**Slide:
Course
Goals**

Course Goals

To introduce:
- benefits, costs, and risks of ITS transit applications
- stages of ITS deployment

To identify:
- APTS applications that relate to your job
- the next steps to take

Transit Management 1-2

**Course
goals**

READ the goals of this course.

Question

Ask if anyone has attended an ITS Awareness seminar.

Explain that this a two day course designed to heighten awareness of ITS as it relates to TRANSIT.

Explain that the table "ITS Courses" on page 3 in the student guide lists courses by course style and shows where this course fits in.

Introduction, Continued

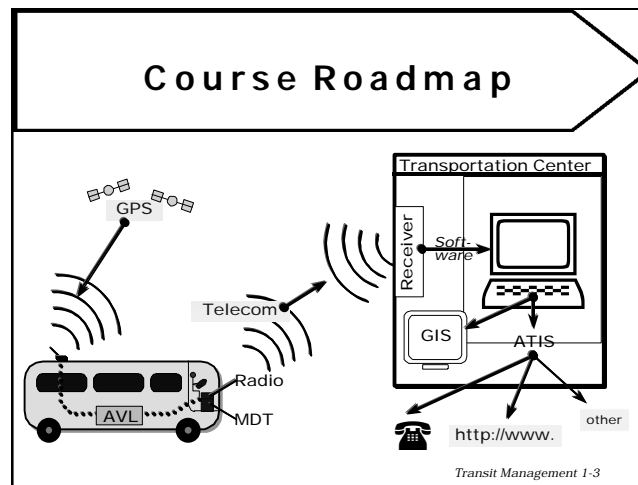| ITS Courses |
|---|
| **Awareness Seminar** |
| Intelligent Transportation Systems Awareness Seminar |
| **Overview Technical Seminars** |
| ITS and the Transportation Planning Process |
| ITS Telecommunications Overview |
| Shared Resources for Telecommunications |
| ITS Telecommunications Analysis |
| ITS Public/Private Partnerships |
| ITS in Transit |
| ITS Systems Engineering/Architecture |
| ITS/CVO Awareness Seminar |
| Innovative Finance Strategies for Deploying ITS |
| **Short Courses** |
| Deploying Integrated Intelligent Transportation Systems |
| Using the National ITS Architecture for Deployment |
| ***Transit Management Course*** |
| Advanced Transportation Management Technology Workshop |

Introduction, Continued

**Slide:
Course
Roadmap**

Course Roadmap

Transportation Center

GPS

Receiver

Soft-
ware

Telecom

GIS

ATIS

Radio

AVL

MDT

http://www.

other

Transit Management 1-3

**SG
reference**

Explain the SG to the class.

- SG is for the students to take home.
- SG contains detailed notes on the lecture materials.
- SG can help by allowing students to follow along in class, or back in the student's office.

Explain Roadmap on page 1 of every module and how it works.

- **Show** slide.
- **Explain** how the technologies are related as shown in the slide.
- **Read** the title of each module.

Introduction, Continued

**Slide:
Course
Roadmap:
Day 1**

> ## Course Roadmap: Day 1
>
> ❶ Introduction to ITS and APTS
> ❷ Automatic Vehicle Location
>   Systems
> ❸ Automated Transit Information
> ❹ Transit Telecommunications
> ❺ Transit Operations Software
>
> *Transit Management 1-4*

**Slide:
Course
Roadmap:
Day 2**

> ## Course Roadmap: Day 2
>
> ❻ Paratransit Computer-Aided
>   Dispatch
> ❼ Electronic Fare Payment
> ❽ Technologies for Small Urban
>   and Rural Transit Systems
> ❾ Stages of ITS Deployment
> ❿ What Can ITS Do for Me?
>
> *Transit Management 1-5*

Introduction, Continued

Introductions   Briefly **introduce**:
- Yourself
- Any visiting VIPs in the room

Ask each student to introduce him/herself:
- Name
- Office
- Job
- Years of service
- Experience with Transit
- Experience with "new" technology or future expected experience or use
- What you expect to get out of this course

Write on the easel:
- Class Expectations
- Each student's expectation for the class

Inform students of basic details about the training site:
- Parking
- Rest room locations
- Starting and ending times for each day
- Lunch times and location
- Telephone policy

Introduction, Continued

Course objectives

Attendees will return to their agencies with greater ability to:

- Identify appropriate APTS technologies for their agency
  ◊ consider how their agency fits in to an integrated ITS infrastructure

- Identify procurement strategies
  ◊ evaluate contracting options
  ◊ select the best buy for services and equipment based on safety, quality, and cost

- Consider the impact of ITS on their organization and within their agency

- Consider the impact of integrating ITS with other agencies in their region
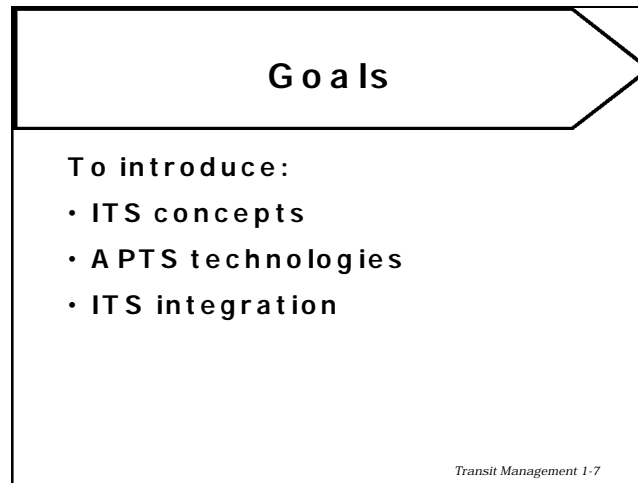
Introduction, Continued

Slide:
Module Title

Module 1

Introduction to
ITS and APTS

Transit Management 1-6
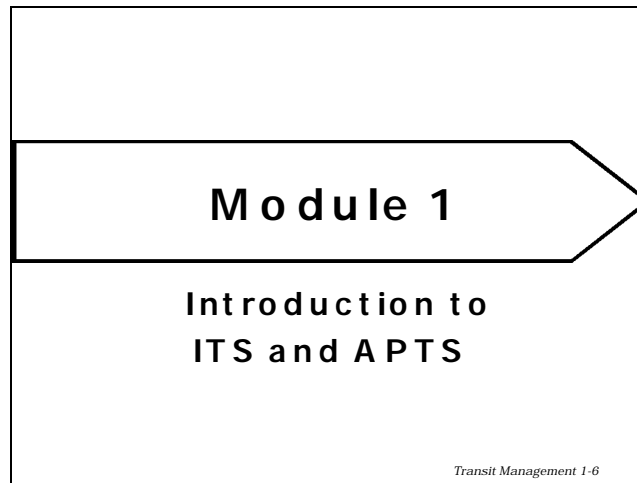
Introduction, Continued

Slide:
Goals

G o a l s

T o i n t r o d u c e :

· **ITS concepts**

· **APTS technologies**

· **ITS integration**

Transit Management 1-7

Goals   **READ** the goals for Module 1. (Be sure to use full names, not just acronyms.)

Introduce the concept that ITS is not simply technology – it needs to be a local "mindset" for integration between modes.
- Technology is the tool that makes ITS integration happen at the local level.
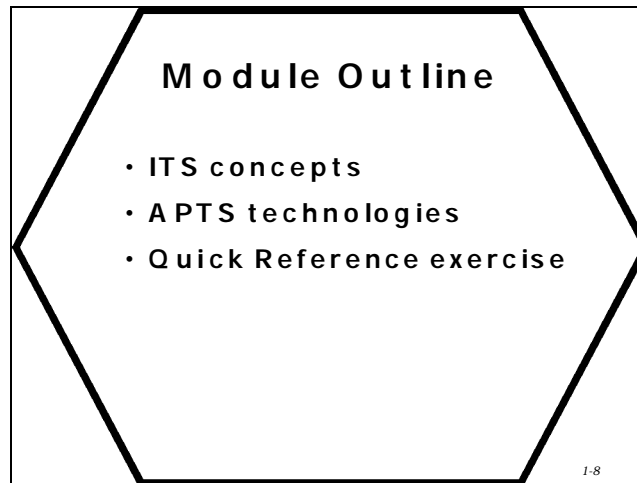
Objective   **Read** the module objective:
- Given an APTS Technology Reference table, students will discuss and select transit technologies that are of most interest to them.

Introduction, Continued

**Slide:
Module
Outline**

M o d u l e   O u t l i n e

· I T S   c o n c e p t s
· A P T S   t e c h n o l o g i e s
· Q u i c k   R e f e r e n c e   e x e r c i s e

1-8

**Module
outline**

**Explain** the module outline.

Say:

- This module will introduce some basic Intelligent Transportation System (ITS) concepts and provide an overview of the Advanced Public Transportation Systems (APTS) technologies that will be presented in modules 2-8.

  ◊ Again, the goal here is to determine which technologies are most relevant to your agency.

- We'll conclude this module by a quick preview of Module 9, which should give you a background on deploying an ITS project, and point you in the direction for where to get help and the next steps to take.
  ◊ Future projects that you'll take on will include ITS components.
  ◊ Integration is the key to making transportation systems perform more safely and efficiently.

ITS Concepts

Length   20 minutes lecture/discussion.

Slide: ITS

Transit Management 1-9
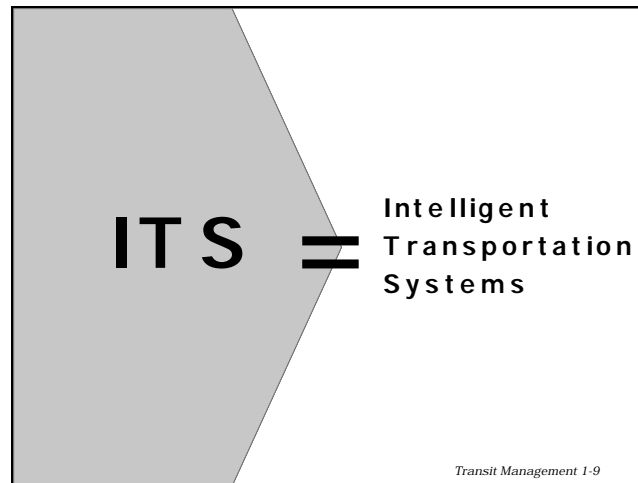
What is ITS?   **Explain** that Intelligent Transportation Systems (ITS) are advanced technologies and applications currently being applied to solve transportation challenges.

The ITS program is sponsored by the U.S. Department of Transportation (DOT) through the ITS Joint Program Office (JPO), the Federal Highway Administration (FHWA), and the Federal Transit Administration (FTA).

• These organizations provide technical assistance to public transit authorities as they plan and implement ITS projects.
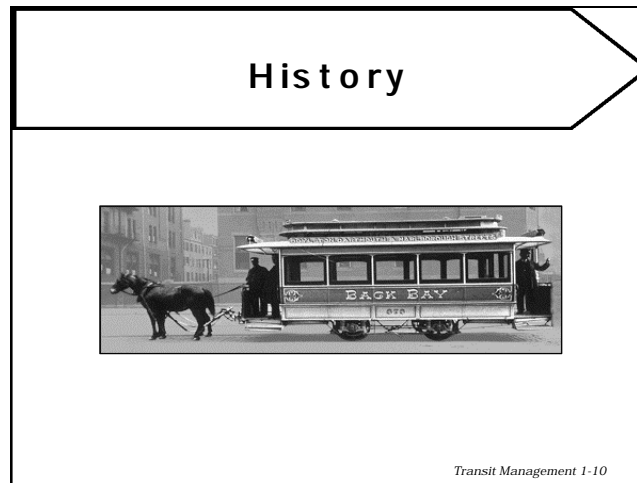
Web site: *www.its.dot.gov*

ITS Concepts, Continued

**Slide:
History**

Transit Management 1-10

**History of
ITS**

Say: ITS, formerly known as the Intelligent Vehicle Highway Systems (IVHS), came to be as a result of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. ISTEA brought unprecedented increases in authorized spending for transit.

- January 1996: Then Secretary of Transportation Frederico Peña launches "Operation TimeSaver," which seeks to install a Metropolitan Intelligent Transportation Infrastructure in 75 major U.S. cities by 2005.

- June 1998: The Transportation Equity Act for the 21st Century (TEA-21, Public Law 105-178) was signed into law, re-authorizing the federal surface transportation program until the year 2003.

ITS Concepts, Continued

Slide: ITS America

ITS Concepts, Continued

ITS America   **Say**: ITS America:
- is the only Congressionally-mandated, national, public/ private organization established to coordinate the development and deployment of ITS in the United States
- is a single, coordinating organization which serves as a clearinghouse for ITS-related information, and as a forum through which public and private-sector stakeholders can work to meet today's challenges
- has the mission to foster public/private partnerships that will increase the safety and efficiency of surface transportation through the accelerated development and deployment of advanced transportation systems
- includes members from federal, state, local and foreign government agencies; national and international corporations; universities, independent research organizations, public interest groups, and other organizations with an abiding interest in solving the nation's transportation problems through the use of ITS technology
- has an APTS committee under it

A projected $400 billion will be invested in ITS between now and the year 2011.
- 80% of that investment will come from the private sector in the form of consumer products and services.
  - ◊ Where does the money go?
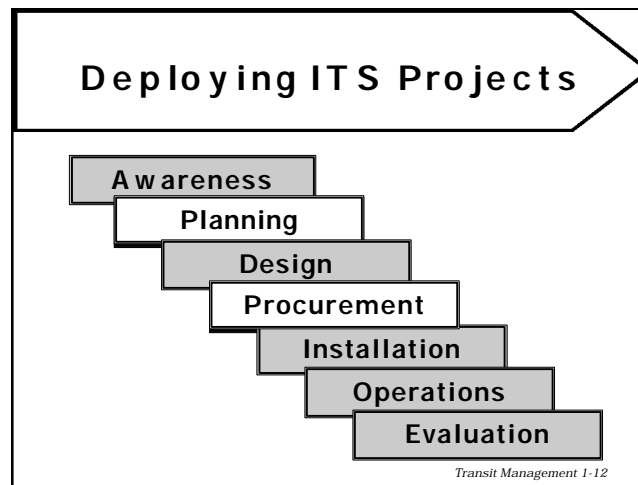 - ◊ How is ITS deployed?

Web site*: www.itsa.org*

ITS Concepts, Continued

**Slide:
Deploying
ITS Projects**

Deploying ITS Projects

Awareness

Planning

Design

Procurement

Installation

Operations

Evaluation

Transit Management 1-12

**ITS
deployment**

Read the stages of ITS deployment:

- awareness
- planning
- design
- procurement
- installation and acceptance testing
- operations and maintenance
- evaluation

Say: You are probably familiar with these if you have attended an ITS awareness seminar or course.

Explain that particular emphasis will be placed on project planning and procurement in ITS project deployment and go over how these functions differ for an ITS project.
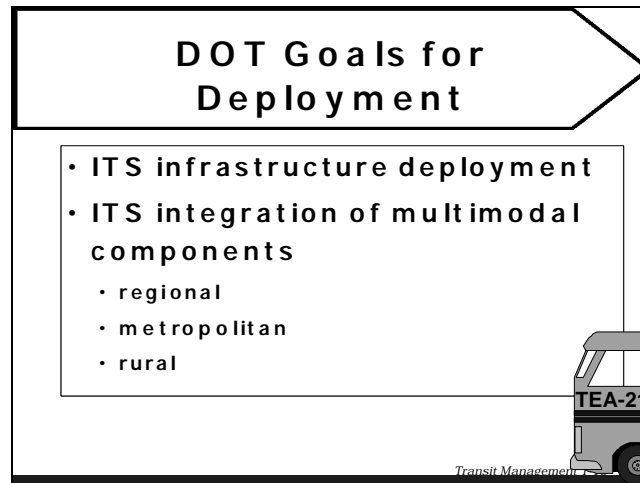
◊ **Explain** that we are using the word "planning" in an informal sense – not in the technical sense a planner might use.

ITS Concepts, Continued

**Slide: DOT
Goals for
Deployment**

```
          D O T  G o a l s  f o r
          D e p l o y m e n t

   · ITS infrastructure deployment
   · ITS integration of multimodal
     components
        · regional
        · metropolitan
        · rural
                                    TEA-21

                         Transit Management
```

**Goals for
deployment**

Say: By the year 2005, it is projected that:

- half of all U.S. transit agencies will deploy Advanced Public Transportation Systems (APTS)
- 75 of the largest metropolitan areas in the U.S. will have deployed Intelligent Transportation systems
- multi-modal/jurisdictional integrated systems will be the focus
- National focus is now also turning to rural transportation issues. We'll talk more about this in Module 8.
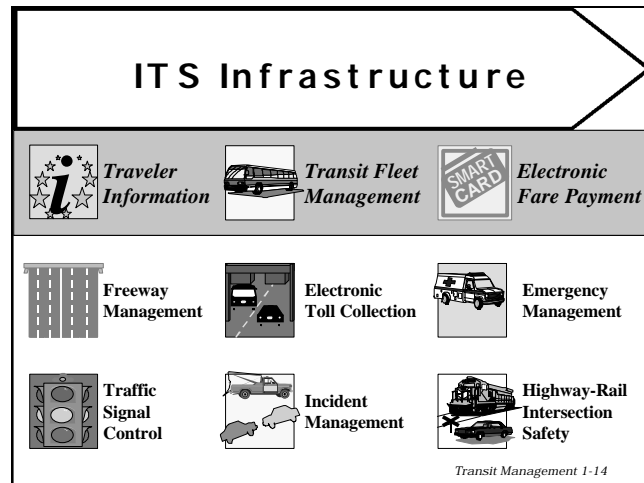
Ask: Is anyone familiar with Metropolitan Intelligent Transportation Infrastructure? Has anyone been working toward implementation of a Metropolitan Intelligent Transportation Infrastructure system?

ITS Concepts, Continued

**Slide:
ITS
Infrastruc-
ture**

**ITS
Infrastruc-
ture and
transit**

Say: Integration of the nine components of the Metropolitan Intelligent Transportation Infrastructure is critical to the efficient management of regional transportation systems.

This course focuses on the three components that are central to Advanced Public Transportation Systems (APTS):
- transit fleet management
- traveler information
- electronic fare payment

There is a table in your student guide that gives a brief description of each of these.

Review the components listed in the table.
- **Ask** if there are any questions.

ITS Concepts, Continued

Components of the ITS infrastructure	
Transit fleet management	enables more efficient transit operations, using enhanced passenger information, automated data and fare collection, vehicle diagnostic systems and vehicle positioning systems
Traveler information	linked information network of comprehensive transportation data that directly receives transit and roadway monitoring and detection information from a variety of sources
Electronic fare payment	uses multi-use traveler debit or credit cards that eliminate the need for customers to provide exact fare (change) or any cash during a transaction
Traffic signal control	monitors traffic volume and automatically adjusts the signal patterns to optimize traffic flow, including signal coordination and prioritization
Freeway management	provides transportation managers the capability to monitor traffic and environmental conditions on the freeway system, identify flow impediments, implement control and management strategies, and disseminate critical information to travelers
Incident management	quickly identifies and responds to incidents (crashes, breakdowns, cargo spills) that occur on area freeways or major arteries
Electronic toll collection	uses driver payment cards or vehicle tags to decrease delays and increase roadway throughput
Highway-rail intersection safety systems	coordinates train movements with traffic signals at railroad grade crossings and alerts drivers with in-vehicle warning systems of approaching trains
Emergency response	focuses on safety, including giving emergency response providers the ability to quickly pinpoint the exact location of an incident, locating the nearest emergency vehicle, providing exact routing to the scene, and communicating from the scene to the hospital

APTS Technologies

Length   25 minutes lecture/discussion.

Slide:
APTS

Transit Management 1-15
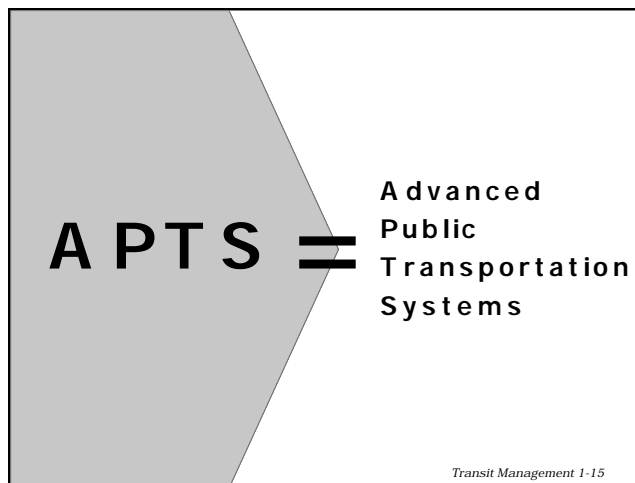
APTS   **Say:** APTS is the acronym for Advanced Public
Transportation Systems. APTS refers to the transit
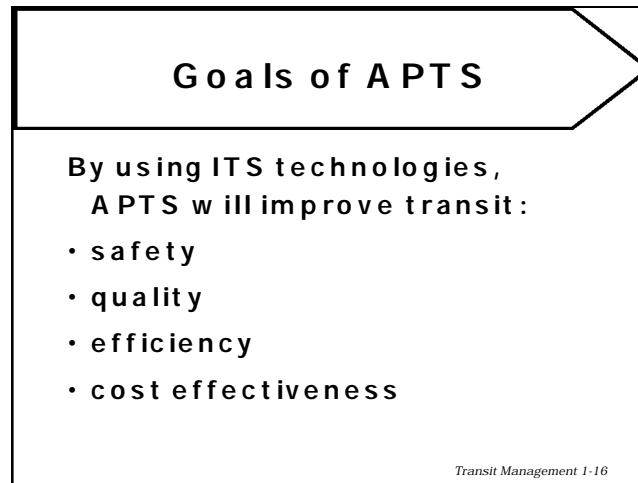components of Intelligent Transportation Systems (ITS).

Web site*: www.fta.dot.gov/library/technology/APTS*

APTS Technologies, Continued

Slide:
Goals of
APTS

> **G o a ls o f A P T S**
>
> **By us ing ITS technolog ies,**
> **A PTS w ill im pro ve transit:**
> · **safe ty**
> · **qua lit y**
> · **efficiency**
> · **cost effectiveness**
>
> *Transit Management 1-16*

Goals of
APTS

Say: The goals of the APTS program are to improve transit safety, quality, efficiency, and cost effectiveness.
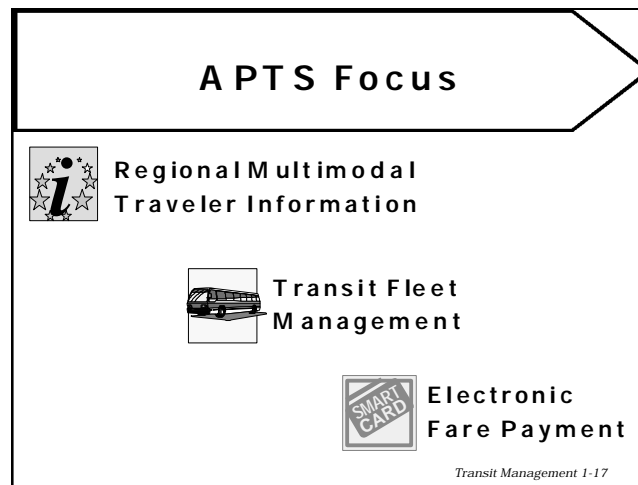
APTS has:
- recognized the importance of increasing public knowledge about transit technologies including advanced navigation, information, and communications technologies in operating models
- made public transportation user friendly

APTS Technologies, Continued

**Slide:
APTS Focus**

> **A P T S F o c u s**
>
> *i* **Regional Multimodal
> Traveler Information**
>
> **Transit Fleet
> Management**
>
> SMART CARD **Electronic
> Fare Payment**
>
> *Transit Management 1-17*

APTS focus   **Say:** recall the nine components of ITS. APTS focuses on
three of them:
- Traveler information
- Transit fleet management
- Electronic fare payment

**Traveler
information**   **Explain**:

Information on multiple transportation modes (e.g., bus, rail,
private vehicle) assists in decision making for more efficient
transit use. This leads to increased customer satisfaction
and ridership.

APTS Technologies, Continued

Transit fleet manage- ment

Explain:

Transit fleet management uses ITS to increase ridership by improving driver/operator and passenger safety, and the efficiency and effectiveness of services by focusing directly on vehicles and operations. These transit fleet management technologies will be discussed:
- automatic vehicle location systems (AVL)
- transit telecommunications
- transit operations software
- paratransit computer-aided dispatch (CAD)

Electronic fare payment

Explain:

Electronic fare payment is electronic communication, data processing, and data management of a fare system and replaces the need for cash or exact change for fare payment.
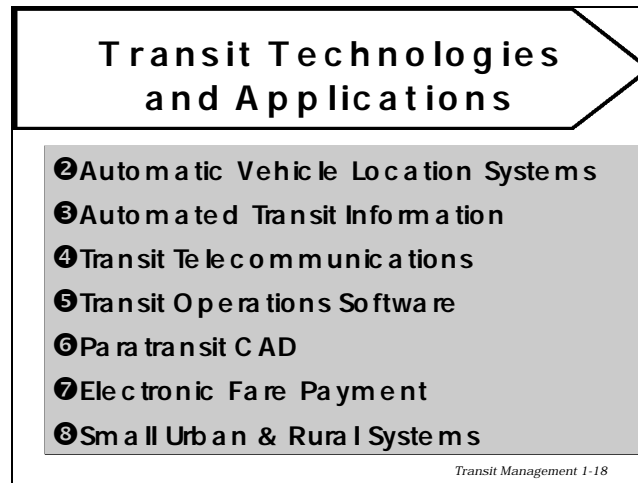- This technology also provides an option for multiple use of payment media; e.g. parking, shopping.
- Cash handling costs and theft are lower with an electronic fare payment system.
- The cash float on the electronic fare payment media contributes to significant gains in revenue for the transit industry.

APTS Technologies, Continued

**Slide:
Transit
Tech-
nologies
and Appli-
cations**

> **Transit Technologies
> and Applications**
>
> ❷ Automatic Vehicle Location Systems
> ❸ Automated Transit Information
> ❹ Transit Telecommunications
> ❺ Transit Operations Software
> ❻ Paratransit CAD
> ❼ Electronic Fare Payment
> ❽ Small Urban & Rural Systems
>
> *Transit Management 1-18*

**Automatic
Vehicle
Location
System**

Say: Module 2 covers AVL and the ability to provide real-time location of vehicles by using Global Positioning System, signposts, or dead-reckoning.

Ask students for one simple example of AVL technology assisting transit.

Explain that if a transit bus, equipped with an AVL system, is involved in an accident, a dispatcher could immediately notify emergency vehicles and send a replacement bus to prevent or minimize delays.

APTS Technologies, Continued

Automated Transit Information

Say: Module 3 will explain how a transit information center receives up-to-date transit information and makes it available to a traveler before the trip and en route.

Ask for one simple personal example from students who have experience planning and deploying automated transit information technology.

Explain (if student didn't provide clear example) the example of kiosks located in stations which could be used by the transit rider to find the best route by selecting a destination or checking to see the real-time arrival of the next bus.
- Other location examples: airports, bus and train stations, malls, public places where buses run

Transit Telecom-munication

Say: Module 4 will focus on technologies and strategies to meet issues regarding the limited capacity of the electromagnetic spectrum. New technologies will require innovative strategies to maximize available spectrum.

Ask: Why is it important to consider telecommunications requirements for your agency?

Explain the importance of considering which telecommunications option will provide the best quality and most reliable transmission for the lowest price if, for example, you plan to install a GPS system in a fleet of 75 buses.

APTS Technologies, Continued

Transit Operations Software

Say: In Module 5 we will discuss how real-time information assists dispatchers with decision making in order to maintain service and reliability.

Ask: How many people have experience working with fleet management or automated operations software within transit?

Explain the example of custom software in a transit control center that displays the location of all light rail vehicles in real time on a map of the transit system.

Paratransit CAD

Say: In Module 6 we will cover how real-time information from computer-aided dispatching (CAD) systems enables rerouting demand-responsive paratransit vehicles.

Ask: Has anyone worked with paratransit computer aided-dispatching systems?

Explain that paratransit could use automatic vehicle location systems (AVL) and geographic information systems (GIS) to re-route a vehicle based on traffic conditions or last minute cancellations.

APTS Technologies, Continued

Electronic Fare Payment

Say: A key point in Module 7 is eliminating the need for cash or exact change by using a system (e.g., a card or other payment media) for fare payment on different modes and for different carriers.

Ask: Who works for an agency with an electronic fare payment system?

Explain that this could mean using one card for bus, subway, and parking fares as well as purchases from retail stores.

Small Urban and Rural Transit Technologies

Say: Applying ITS technologies to existing services used in small urban and rural areas, such as demand response and feeder services, will be discussed in Module 8.

Explain that a vehicle operator receives instructions through a mobile data terminal on the bus and deviates from the bus route (usually along a pre-determined route or distance from the fixed route) to pick up passengers requesting service at the last minute.

Ask: Do we have anyone here from a small urban or rural agency?

APTS Technologies, Continued

Deploying ITS projects

Say:

A technology is just the start. Your job, when your agency begins to deploy projects which have an ITS component, will be to make it work.

- It can involve working with different people and agencies than you are used to, finding new procurement avenues, planning with more flexible and sometimes shorter schedules and agreements.

We'll discuss these options in more detail in Module 9.

APTS Technologies, Continued

**Slide:
Quick
Reference
Guide**

Transit Management 1-19

**Quick
reference
cards**

Introduce the two Quick Reference Cards that follow.

- APTS Quick Reference Card
  ◊ features the more common technologies that we will
    spend time on in this course

- Other APTS Technologies
  ◊ feature other technologies you may want to explore and
    which more agencies are beginning to use
  ◊ examples: in-vehicle diagnostics and traffic signal
    priority
  ◊ At the end of the course, we'll talk about how to learn
    more about them.

Say: The first Quick Reference Card will be used in the next
exercise. Spend two minutes reading these now. Then we
will do the exercise.

*Note: This course concentrates on the technologies of most
interest to field personnel.*

APTS Technologies, Continued

Note to instructor   In **Quick Reference Card 2: Other APTS Technologies** - note that people have shown apprehension in using real-time ridesharing because of safety concerns.

Slide: Summary

```
                    Summary

                              Transit Management 1-20
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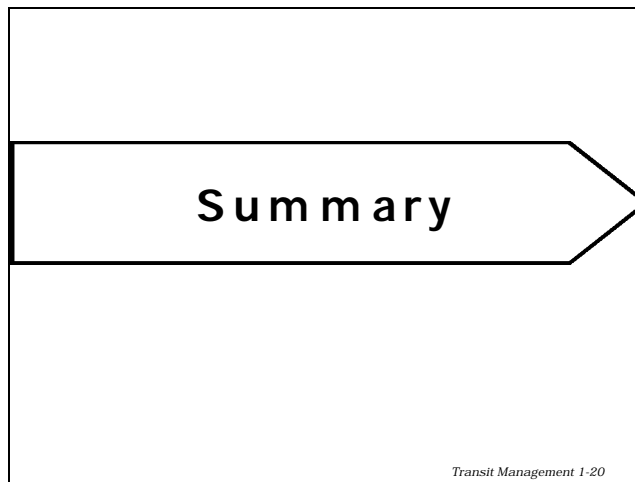
Summary   Explain resources that will provide students with additional information. Refer to appendix for listings of related courses.

APTS Technologies, Continued

Where to go next   For follow up to this module, additional courses are shown below.

Transit Management Training Course	Title	ITS Professional Capacity Building		NTI course
		Technical Seminars	Short Courses	
Module 1: Introduction	Intelligent Transportation Systems Awareness Seminar	x		
	ITS/CVO Awareness Seminar	x		
	ITS in Transit	x		
	Advanced Transportation Management Technology Workshop		x	
	Intelligent Transportation Systems for Transit: Solving Real Problems			x
	NTI Fellows Program			x

APTS QUICK REFERENCE CARD 1			
Acronym	*Name*	*Description*	*Examples and Uses*
Transit fleet management		Uses ITS to improve driver and passenger safety and efficiency and effectiveness of services by focusing directly on vehicles and operations.	
AVL	**A**utomatic **V**ehicle **L**ocation systems	Computer based tracking systems used to monitor vehicles and track real-time location of vehicles. Data collected can be used for: • making corrections to deviations in service if used with Transit Operations Software such as Computer Aided Dispatch (CAD) • input to passenger information systems • emergency location of vehicles	Location Technologies: • GPS • Signpost and odometer • Radionavigation/location • Dead-reckoning Data Transmission to dispatch: • polling • exception reporting
	Transit Telecom-munications	Telecommunications technology is changing to make better use of the limited electromagnetic spectrum. Traditional land mobile communications services will not meet all APTS needs. Innovative strategies ease strain on communications and include: • trunked radio • overlaying on transmissions by conventional commercial FM radio • low earth orbit satellite services • cellular phone	Typical applications: • bus and control center communication • fare payment • park and ride operations • HOV / express lane access • adaptive signal systems • intermodal communications • workplace / home transit and intermodal information • wayside transfer center transit and intermodal information • on-board information
	Transit Operations Software	***TOS: Transit Operations Software*** Software solutions are focusing on increasing customer satisfaction and enhancing operations. Advanced functions include: • real-time dispatching • quicker response to disruptions in service • coordination between modes • dynamic route rescheduling for paratransit applications • combination with hardware to make operator interface easier	Typical applications: • fixed route bus • rail • paratransit • advanced communication • mapping / GIS software • radio frequency communications • AVL Linkage • on-board mobile data terminals Links to AVL technology and paratransit applications are the most common applications.

APTS QUICK REFERENCE CARD 1			
GIS	**G**eographic **I**nformation **S**ystems	Combination of an electronic map with a relational database to allow users to visualize and analyze location information Necessary components include: • computer hardware • software • data	Uses include: • bus routes • shelters • emergency call location • trip planning • performance data • ridesharing • paratransit
Acronym	*Name*	*Description*	*Examples and Uses*
Electronic fare payment		Electronic fare payment systems integrate card technology, communications, information systems, and electronic funds transfer systems to improve fare payment convenience and reduce fare system costs.	

	Automated Fare Payment	Advances in Automated fare payment are making possible:
		• more sophisticated fare pricing systems, based on distance traveled or time of day
		• reduction of cash and coin handling and the associated costs
		• improved security
		• automation of accounting processes
		• improved reliability of fare boxes (no moving parts)
			Smart Cards in use:
			• magnetic stripe card
			  • WMATA, LA MTA, NYC MTA and others
			• contact chip card
			  • several universities, phone card companies, and Atlanta MARTA
			• RF proximity card
			  • partnerships with Visa Cash, Ventura County, WMATA GO Card

	Multicarrier or Multiuse or Integrated Payment System	Integrating the payment system of one transit operator with that of another entity, such as: • transit operators • human service benefits programs • electronic toll collection systems • bank card systems	Efforts at integration are underway by King County Metro in Seattle, San Francisco Bay Area MTC, Greater Cleveland Regional Transit Authority, and others
Regional multimodal traveler information systems		Information on multiple transportation modes to help decision making of traveler	

APTS QUICK REFERENCE CARD 1

	Automated Transit Information	Information provided to the traveler includes: • transit routes • schedules • fares • schedule updates • real-time arrival/departure times • stops • connections	Where it's happening: • Pre-trip • In-Terminal/Wayside • In-Vehicle Access media: • telephone (most common) • monitors • cable TV • variable message signs • kiosks • personal computers (internet) • hand held devices
	Multimodal Traveler Information	Sharing and integration of Traveler Information Systems between modes	Multi-jurisdictional cooperation

QUICK REFERENCE CARD 2: OTHER APTS APPLICATIONS AND TECHNOLOGIES

Other Transit information systems

Acronym	Name	Description	Benefits
	Mobility Manager	A centralized office through which riders or agencies can book trips on at least two modes • billing is facilitated by Automated Service Coordination • formerly known as Mobility Manager	• integration and coordination of transportation services offered by multiple providers • greater economies of scale gained by smaller agencies • excess capacity used by the cooperating agencies • transit and HOV services are more appealing alternative modes
	Real-time Ridesharing	Individual trips arranged on short notice, typically in private autos, although vans and taxis may be included • also known as dynamic or single-trip ridesharing • the traveler initiates a request to the central database • the database searches for a match with rides offered by drivers registered for the program • car or van pooling, or other rides arranged in advance, or on a regular basis are not included	• enables commuters to take advantage of time savings of HOV lanes • provides quickly obtainable alternative mode of travel • people have more choices

Other Transit fleet management technologies

QUICK REFERENCE CARD 2: OTHER APTS APPLICATIONS AND TECHNOLOGIES

Acronym	Name	Description	Benefits
	In Vehicle Diagnostics	The continuous automatic measurement and reporting of real-time vehicle component status • no driver intervention in reporting conditions to dispatch • out-of-tolerance conditions must be passed to dispatch in real time • also known as automatic vehicle monitoring or vehicle component monitoring Vehicle components include: • engine oil pressure • engine temperature • electrical system • tire pressure	• quicker notification of mechanical problems with the vehicles reduces maintenance costs • increases overall dispatch and operating efficiency • more reliable service, promoting increased customer satisfaction • quicker response to or prevention of service disruption • inputs to passenger information systems on service disruptions • properly maintained buses pollute less
Acronym	*Name*	*Description*	*Benefits*
	Traffic Signal Priority	A means of giving high occupancy vehicles (especially buses) and emergency vehicles priority at traffic signals by advancing the green signal phase or extending the green phase in order to minimize the HOV delay • also known as adaptive signal timing • priority may be actuated manually or automatically	• increased schedule adherence • more reliable service, promoting increased customer satisfaction • improves commuter time over private vehicles • improves run times • less idling and stopping saves on energy costs
	Automated HOV facility monitoring	Techniques for identifying the number of passengers in a vehicle to facilitate HOV enforcement • measures run times	• enables transit to obtain comparative time advantages over private vehicles • planners can accurately gauge run times if HOV lanes are not congested • improved schedule reliability and operating efficiency

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TMC	**T**ransportation **M**anagement **C**enters	A facility that combines traffic and public transit operations, communications, and/or control; in a "virtual" TMC, traffic and transit facilities share real-time information in order to enhance each operation without being housed in the same physical location • Direct communications and subsequent decision-making can occur readily between the respective operators during peak traffic periods • Can be critical in developing traffic signal priority systems for transit vehicles • TMCs without transit information are still called traffic management centers	• direct communication with emergency services increases customer and operator security and safety • improves schedule reliability and operating efficiency • links freeway, traffic and transit information and operations • enhances transit stature and ensures that transit receives ample consideration within the regional transportation policy
APCs	**A**utomatic **P**assenger **C**ounters	An automated means for collecting data on passenger boardings and alightings by time and location • Most new APCs are incorporated or considered in AVL systems • APCs are much lower in cost than manual checkers	Data is used for: • planning • future scheduling • decisions on corrective actions • reporting

Exercise 1-1: APTS Quick Reference Card

Length   5 minutes

**Slide:
Exercise 1-1**

Pick your interest

Exercise 1-1:
APTS Quick
Reference Card

Transit Management 1-21
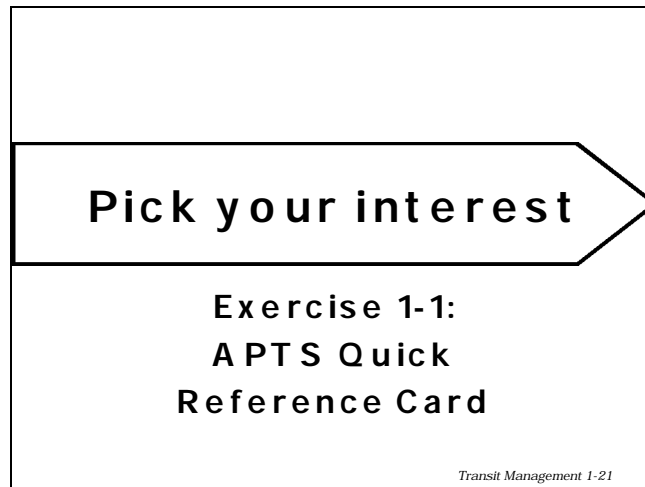
**In this
exercise**   You will:
* discuss and select the transit technologies that are of most interest to you

Directions   Read Quick Reference Card 1. Circle the three items that seem most interesting to you.

Question 1   How could your agency or agencies in your region benefit from each technology? List three ways.

Continued on next page

Exercise 1-1: APTS Quick Reference Card, Continued

Question 2   List three risks associated with the technology.

Question 3   What integration issues will you face in your region with these technologies?

Exercise 1-1: APTS Quick Reference Card, Continued

**Summary
Module 1:
Introduction**

Note to instructor: *Emphasize these instructions, since this is the first time you will go to module 10. Every module ends by the students summarizing their notes in module 10. If this is not carefully done, the exercise in module 10 will not work.*

Tell the students to turn to the Module 1 summary page in Module 10, on page 5 in their student guides.

- **Tell** them to fill in item 1 by circling the most appropriate selections that describe their agencies.
  - ◊ Students will have more than one item circled.

- In item 2, tell the students to read the examples of ideas and action items that have been provided for them.
  - ◊ **Tell** the students to circle "Yes" or "No" if any of the examples listed apply to them.

- **Tell** the students to write their own action items and/or ideas that this module suggests to them. For example:
  - ◊ Are there any questions you want answered?
  - ◊ Were there any web sites that you wanted to look at when you return to your office?
  - ◊ Were there any courses or resources you wanted to find out more about?
  - ◊ Did we mention any transit example that you want more information about – who can you contact and where?